by a method which forms the subject of the second section of this paper.

When a plate of glass is brought to a full red heat, and is then cooled by placing its edge on a bar of cold iron, the same fringes of colour are developed during cooling as by placing cold glass upon hot iron; and in this case the glass retains the property given to it even after it is completely cold.

The author delineates various configurations of colours produced by plates of different forms thus cooled. Among many others, a parallelogram of glass exhibits an inscribed parallelogram, with lines from each angle to the angles of the plate; and when the plate has been divided longitudinally by a diamond, each of the portions again exhibits an inscribed parallelogram, just as if the parts had been separately heated; and in this respect they present a property analogous to that of a divided magnet, each part of which has opposite poles as the entire bar.

A circular plate of glass, cooled with its centre resting on a piece of cold iron, or a cylindrical rod of glass cooled in the open air, when examined by polarized light in the direction of its axis, each present the same appearance of a black cross through their centre, and concentric fringes parallel to their circumference.

Since it is obvious that in these cases of rapid cooling, as well as those of rapidly heating, there must be progressive variations of density of the glass proceeding in a direction from the source of heat or of cold, and since the phenomena exhibited by many crystallized bodies, when examined in the direction of their axis, are precisely similar, Dr. Brewster infers that there exists in these crystallized bodies also a corresponding variation of density, proceeding toward their axes, which will afford an easy explanation of the fringes they exhibit.

Farther Experiments on the Combustion of explosive Mixtures confined by Wire-gauze, with some Observations on Flame. By Sir Humphry Davy, *LL.D. F.R.S. V.P.R.I.* Read January 25, 1816. [*Phil. Trans.* 1816, *p.* 115.]

In these experiments, the author examines what magnitude of wire and of apertures in the metallic gauze of his lamp is consistent with security against explosion of mixtures externally.

When the gauze is made of wire one fiftieth of an inch in diameter, and at intervals of one tenth, so as to make 100 apertures in the square inch, explosion may take place, either from intense ignition of the top of the lamp, or from lateral currents of air forcing the flame through the interstices.

When the intervals of the same wire were only one fourteenth, though the danger from lateral motion was obviated, still ignition of the wire caused explosion. With intervals of one sixteenth, still there was danger from the same source; but when the distances were reduced to one twenty-fourth on 576 apertures in the square

inch, then the lamp appeared safe, under all circumstances, in mixtures of coal gas and air.

With a view to explain the non-transmission of inflammation through small apertures, the author considers the nature of flame in general; and since a piece of phosphorus, or even a small taper, will burn in the midst of a large flame made by the combustion of alcohol, he is of opinion that oxygen exists in the centre of all flame, forming an explosive mixture with the vapour, but which burns solely at the exterior surface, because it is there alone sufficiently heated to take fire.

If a piece of wire-gauze be held in the flame of a lamp, or of coal gas, no flame passes through the gauze; for though a portion of the inflammable vapour passes, it loses too much heat in its passage to propagate the flame; but in the case of inflammable mixtures of coal gas entering a lamp, and burning at the interior surface, that which is exterior has not been exposed to any heating cause, and consequently is in no danger of taking fire at the sides of the lamp; and the results of combustion which escape at the top, though heated, are no longer inflammable.

In conclusion the author informs us, that these lamps have now been tried in two of the most dangerous mines near Newcastle with perfect success; and he has great hopes that they will shortly be adopted in many of the collieries in that neighbourhood.

Some Observations and Experiments made on the Torpedo of the Cape of Good Hope in the Year 1812. *By* John T. Todd, *late Surgeon of His Majesty's ship Lion. Communicated by Sir* Everard Home, *Bart. V.P.R.S.* Read February 15, 1816. [*Phil. Trans.* 1816, *p.* 120.]

The fish on which these experiments were made, were generally caught early in the morning, and examined as soon after as possible, but in some instances were kept in buckets of water as long as three days, or more.

They are frequently caught by the seine in Table Bay, to the westward of the Cape, but very rarely in Simon's Bay, which is to the eastward, and never caught by the hook with any kind of bait.

The Torpedo of the Cape differs in no respect from those of the Northern Hemisphere, except in size, which is never more than eight inches long and five in breadth. The columns of their electric organs appeared larger and less numerous than those described by Mr. Hunter. The form of any one singly is cylindric, but in a section of a whole organ the figure is modified by lateral compression.

The author found the supply of nerves to these organs, agreeably to former descriptions, to be larger than to any other parts.

The greatest shock they give was never felt above the shoulder, and rarely above the elbow joint, the strength of it depending more upon the vivacity of the animal than upon its size. There appeared